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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

A SCIENCE SERVICE PUBLICATION

MEDICINE

See Cerebral Palsy Clue

THE CAUSES of cerebral palsy and mental retardation in children are the object of a study of 400,000 women who will be pregnant sometime between now and 1964, the U. S. Public Health Service announced.

Each year, for the next five years, 8,000 volunteer expecting mothers will be observed in 16 institutions throughout the country. Doctors hope to pinpoint the exact cause or causes of cerebral palsy, the muscular paralysis that occurs when the brain or spinal cord is damaged. They may find clues that will lead to the explanation for mental retardation, too, Dr. Richard L. Masland, assistant director at the National Institute of Neurological Diseases and Blindness, said.

The major source of the problem of cerebral palsy, mental retardation and other neurological disorders is now believed to lie in the perinatal period, the time span from conception to about one month following the birth of the baby.

Previously, when one of these disorders was discovered, sometimes not until as much as two years after the birth of the child, attempts were made to review the medical records of both the child and mother. It has been difficult to establish cause and effect relationships in this "retrospective" manner, however.

Now the obstetrical care of the mother and a history of the child's first month will be intensely studied. Actually, more than 1,000 mothers have already volunteered since January of this year.

Each mother will be studied for the following: conditions of pregnancy itself, including infections, trauma, bleeding, drugs, progress of labor; social and economic conditions, emotional stress and medical care. Age, medical and reproductive history, immunological characteristics and genetic background of both parents will also be studied.

The children will be observed for disorders of the nervous system of all products of conception at the time of delivery, or appearing during infancy or early childhood.

A complete study of the first child born to a mother enrolled in the study will not be finished for at least six years.

Science News Letter, June 13, 1959

BIOLOGY

Birds Near Equator Follow Own Reproductive Cycle

SOUTH OF the border a sparrow's thoughts turn to "love" even when it is not spring.

A year-long study of the Andean sparrow indicates that the bird has its own reproductive cycle independent of the season. Birds living near the equator have their own inner rhythm, reproducing twice as often as birds in other regions of the earth, said Dr. Alden H. Miller, professor of zoology at the University of California, Berkeley. Outside the equatorial region, birds have adjusted to their environment so that they nest once a year in the spring.

By banding 160 wild birds, Dr. Miller was able to observe closely the birds' behavior week by week. He also used a simple surgical means to examine their internal organs from time to time.

Since the birds follow their own cycle, some young are produced in every month of the year. The fledglings, Dr. Miller found, matured early and began to nest as early as five or six months of age. The birds have a complete reproductive cycle every six months; they nest for four months and remain dormant for the other two.

Dr. Miller reported on his study to the National Academy of Sciences.

Science News Letter, June 13, 1959

PHOTOGRAPHY

Professional Movie Film Has Increased Sensitivity

A SUPER-SENSITIVE professional motion picture color film has been developed that promises the viewer "more interesting and exciting movies—some of them shot where color cameras could never go before" because of poor light.

Eastman Kodak Company, Rochester, N. Y., reports that its new negative film is twice as "fast" as existing film yet holds high picture quality by being no more grainy than present films.

It promises substantial savings to the movie industry as well as equal or better quality pictures. For example, the film allows a movie-maker to cut studio lighting in half. When reduction in illumination is not necessary, the increased speed (greater sensitivity) of the film permits the photographer to use a smaller lens opening, which results in greater over-all sharpness in the scenes he photographs.

An important feature of the new film is that it can be processed with the same processing solutions and procedures of currently used films.

Primarily developed for existing 35 millimeter cameras, the film also will be made in 65mm (Todd-AO) and 70mm widths. Standard reel lengths are to be 100, 400, 1,000 and 2,000 feet.

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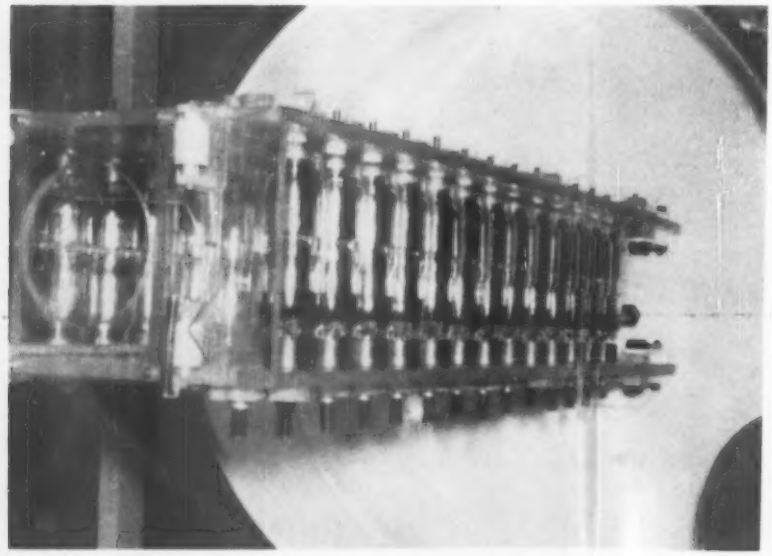

DYNAMITRON ACCELERATOR—This bank of rectifiers, producing 1,000,000 volts of electron in the evacuated beam tube, is the "heart" the new accelerator developed by Radiation Dynamics, Inc. Use of this machine could reduce cost of irradiation processing as much as 90 percent, it is said.

Questions

CHEMISTRY—What efficiency has been achieved with a new improved fuel cell that produces electricity directly from oxygen and hydrogen. p. 372.

GEOPHYSICS — How much time is being gained each day? p. 371.

PUBLIC HEALTH—What maximum permissible level for strontium-90 has been set by an international committee? p. 378.

Photographs: Cover, Florida State News Bureau; p. 370, Radiation Dynamics, Inc.; p. 371, A.E.I. Lamp and Lighting Co., Ltd.; p. 373, The B. F. Goodrich Company; p. 374, U. S. Department of Agriculture; p. 375, Corning Glass Works; p. 378, Fremont Davis; p. 384, Eastman Chemical Products, Inc.

GEOPHYSICS

Day Getting Longer

Scientists for 200 years have been puzzled by the gradual lengthening of the 24-hour day. Today it is explained by the slowing down of the earth's rotation.

THE 24-HOUR DAY is getting a little longer every year although the exact cause is still a mystery.

Measured by two successive transits of the sun or a star across the zenith, the day is lengthening at the rate of about one hundred-thousandth of a second each day per year, according to Profs. Walter H. Munk of the Scripps Institution of Oceanography, La Jolla, Calif., and Gordon J. F. MacDonald of the University of California at Los Angeles.

This means that now the day is actually two-hundredths of a second longer than a day was 2,000 years ago. Taking the mean of the two-hundredths figure, which is one-hundredth of a second, and multiplying it by the number of days in the last 2,000 years, we get an accumulated time of 7,300 seconds, or a little more than two hours.

The sun's center, therefore, now passes the same zenith two hours later than it did 2,000 years ago, and a clock, set at the time of Christ's birth, would now be about two hours fast.

The reason is the gradual slowing down of the earth's rotation, so that it now takes any spot on the globe longer to line up twice with the same celestial measuring point than in preceding years.

The first scientist puzzled by this phenomenon was the 18th century English astronomer, Edmund Halley. He found that the astronomical dates for eclipses of the pre-Christian era did not agree with the dates indicated on early Babylonian tablets and Greek papyri.

Later astronomers and mathematicians continued to investigate, and finally decided that the slowing of the earth's rotation resulted from the loss of energy in ocean tides.

The explanation, however, did not satisfy the two University of California professors. By re-examining the ocean tides and computing their forces, they concluded that the energy of the tides is not enough to account for the slowing of the earth's rotation.

"We still do not know what causes the earth to slow down," Prof. MacDonald said, "but we do know that the hitherto accepted explanation is invalid. Now we can go on and try to find the reason."

The findings of the two scientists will be included in their book on "The Rotation of the Earth," to be published by Cambridge University, England.

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ATOMIC LAMP—The radioactive gas-filled lamp bulb is being placed between two spheres of plastic, then placed in a metal can fitted with a prism and mounted for indicator use.

MINERALOGY

Libyan Desert Glass Found Earthly in Origin

THE PECULIAR silica-glass formations found on the Libyan Desert are earthly in origin, not objects from space.

Dr. Alvin J. Cohen of the Mellon Institute, Pittsburgh, Pa., reached this conclusion from an analysis of the germanium content of the objects, compared with many other materials, including meteoritic stones.

All fused silica produced artificially from natural quartz contains trace germanium impurity.

He found that the composition of the silica-glass is chemically and mineralogically similar to the sands of the Libyan desert.

The objects were probably formed by the impact of a "cosmic body," Dr. Cohen reports in *Nature* (May 30). In this regard, he said, the area around 22° 18′ N. and 25° 30′ E., containing explosion craters (as well as volcanic evidence), should be more thoroughly investigated.

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ENGINEERING

Nuclear-Powered Light Will Work for Years

AN ATOMIC lamp that can work for ten or twelve years without any power supply has been developed by British scientists. Although the experimental lamps are tiny, about twice the size of a matchstick, they mark a major development in a new form of lighting.

The lamps, developed by British Associated Electrical Industries, Leicester, England, can immediately be used as indicator lights. When larger lamps are developed they may be used as markers for buoys, life rafts, ammunition dumps and even as warning lights on road obstructions.

The lamps actually look like glass matches. They have a long thin glass stem that bulges out into a small bubble at one end. The bubble is coated with phosphors, and the tube is filled with radioactive gas. The radioactive rays emitted by the gas cause the phosphor to glow brilliantly. It needs no other form of energy, and will keep on glowing for a decade.

At present the lights are still in the laboratory stage. Developers of the lights claim they are safe. Lamps using tritium gas give out such weak radioactive rays they do not even penetrate the glass bulb. Krypton 85 is another gas that has been used in the lamps, and lamps filled with this gas need lead shielding to make them completely safe.

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TECHNOLOGY

Make Radiation Measurer

A STAND-IN for the human body that can be used in experiments to determine the effects of radiation on vital body organs has been developed.

Called the "phantom" patient, it has the same mass density or atomic number as soft tissue, Frank Dreisinger, director of technical services of the Picker X-Ray Company, White Plains, N. Y., said.

This close imitation of the human body is said to make possible any number of investigations with X-rays and evaluations that would ordinarily require exposing humans to radiation.

The artificial stand-in human represents a section of the human body from the waist to the mid-thigh. Within this area, however, it has every bone structure of these regions: pelvis, thigh bones, sacrum and lower spine.

Now researchers have a "body" available with known thicknesses and degrees of X-ray opacities. Tissue-absorption can be measured by placing an ionization detector in the mid-plane cavity in the "phantom's" body. Thus investigators will be able to determine how much radiation the organs in this area are receiving.

Formerly, the only method which could determine this same information was to open a human and place the detector inside.

The stand-in human will also enable makers of X-ray equipment and accessories to check their products and will enable doctors to study new techniques and products such as barium, tracing dyes, cassettes, or roentgenographic plate holders, film and film developing chemicals.

The "phantom" was developed by Alderson Research Laboratories, Inc., and is being distributed by Picker.

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CHEMISTRY

Fuel Cell Developed

AN IMPROVED FUEL CELL that produces electricity directly from oxygen and hydrogen has been developed.

The fuel cell generates electricity by means of a chemical reaction. In this cell, described by General Electric scientists, hydrogen and oxygen produce the electric current, giving water as a by-product.

The new device operates efficiently at room temperature and normal atmospheric pressure. Thermal efficiencies over 60% have been obtained.

"The fuel cell may find both civilian and military uses," Dr. Guy Suits, General Electric vice president and director of research, said, "despite the fact that it produces low-voltage direct current.

"We cannot yet determine how competitive it will be with other power sources," he said, "but its special characteristics may well fit it for a variety of uses . . . Military and space vehicle applications might make use of the fuel cell's high reliability, simplicity, portability, light weight, and small volume."

The fuel cell consists of a round plastic disk about one-half inch thick and three inches in diameter. Its hollow interior is divided into two chambers by a special plastic membrane, which has an electrode in contact with each of its sides. Hydrogen is fed into one chamber, and oxygen into the other. At one electrode, the hydrogen molecules break up into electrons and positively charged hydrogen. The electrons travel through an external circuit to the other electrode, thus creating an electric current. The positively charged hydrogen moves through the membrane to the other electrode, where it combines with oxygen and the electrons from the external circuit to form water.

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MEDICINE

Study Spinal Arthritis

HEART DAMAGE and colitis may be important clues to a painful spinal disease.

Research reported at the Pan American Congress on Rheumatic Diseases meeting in Bethesda, Md., links "poker spine," or ankylosing spondylitis, an extreme form of a type of spinal arthritis, with damage to the aortic valve and to bowel inflammation.

Six cases of poker spine were discovered among 100 patients with ulcerative colitis, Drs. Nathan J. Zvaifler and W. Martel of Ann Arbor, Mich., said. X-rays of patients with this bowel condition should be carefully examined for the occasional case of spinal arthritis that develops, they suggested.

The aortic valve which controls blood flow pumped by the heart to the main artery or aorta is uniquely affected in cases of poker spine (so called because it produces "a stiff, frozen back").

In this disease, Dr. Hugh A. Smythe of Toronto, Canada, explained, collagen, a soft supporting material of the body, is attacked.

In studying the heart in several cases of poker spine, Dr. Smythe found, "the whole valve mechanism is dilated and sags downward into the outflow tract of the left ventricle" or pumping chamber of the heart. However, he pointed out that the development of satisfactory oxygenating pumps have made direct aortic valve surgery possible in some cases.

New evidence that hormone treatment intensifies blood vessel inflammation in rheumatoid arthritis patients was also presented to scientists attending the Congress.

Steroids are now the only known helpful treatment for reducing joint inflammation temporarily. Dr. J. Peter Kulka of Boston, Mass., explained they also tend to increase the pre-existing vessel inflammation.

Studies were made of some 12 rheumatoid arthritic patients.

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ASTRONAUTICS

Space Suit Designed

A full pressure space suit has been developed which surrounds the astronaut with an earth-like environment and is safe for forced escapes and ejections at high accelerations.

THE MARK IV space suit has been introduced to the public.

The full-pressure suit was developed by the B. F. Goodrich Company and the U. S. Navy. It may be the suit chosen for the first manned flight.

A model dressed in the suit jumped into a pool of water where he demonstrated his ability to swim, manipulate and enter a life raft. Another subject was exposed to extreme temperatures. The suit proved to be safe for high acceleration force escape procedures, or ejections.

Then a model in a suit successfully withstood a test of rapid decompression. The suit can buffer temperatures from plus 220 degrees Fahrenheit to minus 70 degrees Fahrenheit, and swift altitude changes that shoot from 18,000 feet to 75,000 feet in less than half a second.

The Mark IV allows a high flyer to surround himself with an earth-like environment. This environment, contained within the tightly sealed suit, can comfortably protect a human on his way to outer space.

In fact, if a man in a Mark IV suit should land on the moon, the suit is flexible enough to allow him and his space craft buddies to play a game of baseball. On the moon, gravity is so weak that the ball for an earthly Mickey Mantle home run would travel about one-half mile.

The suit weighs 20 pounds. It consists of a torso, helmet, gloves and boots. A pressure sealing zipper slants across the chest section. The spaceman's shoulders, legs and arms can move easily due to a knit stretch fabric within the inner layer of the suit.

The plastic helmet has a large window in front. A valve permits exhaled air to pass from the respiratory section to the torso. There are earphones inside the headpiece.

J. W. Keener, president of B. F. Goodrich Company, pointed out a future potential for the suit when he said that many of our launching failures would have been successful had a pilot been aboard to control the vehicle when it strayed off course

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SPACE FLYER—The flexibility of the Mark IV space suit is demonstrated by this moon-ball player astronaut.

MEDICINE

Anesthetic Kills Monkey

Monkey Able, one of the first animals sent into space and successfully recovered, has subsequently died, possibly as a result of anesthesia administered in a minor operation.

MONKEY ABLE has received "at least as thorough a post-mortem" medical examination as a human would who died from a mysterious cause.

Although doctors have stated their belief that the little seven-pound veteran of space flight did not die of causes related to the space flight, a careful autopsy was conducted to confirm—or disprove—this belief.

A microscopic autopsy has produced no evidence that the monkey suffered any radiation damage during its 300-mile high ride in a rocket. (See SNL, June 6, p. 355.)

On the basis of the report it is also presumed the monkey suffered no damages from the stresses of blast-off and re-entry into the atmosphere. Its weight was multiplied briefly as much as 38 times during these periods.

The need for a critical examination was obvious in the light of America's plans to send man into space. Is it possible that space flight may produce such stresses on a living body that another shock, such as surgery, could tip the balance for death? This question must be answered satisfactorily before NASA's first astronaut climbs into the space capsule now under test for him.

A NASA representative pointed out that occasionally men and women have died unexpectedly while breathing an anesthetic. He said Monkey Able may have reacted in an unusual way to the trichloroethylene anesthetic she received before a scheduled operation. The operation was to have been for removal of an electrode imbedded just under the skin. The electrode was used to gather bio-medical information about her body to radio back to earth during her 15-minute flight 300 miles into space.

The medical studies were run at the Armed Forces Institute of Pathology.

From the scientific point of view, Able's death may lead to more immediate information on the possible effects of space travel on a primate. Original plans had called for Able to be "retired" until her natural death, when an autopsy would then have been run. But those results might have been clouded by attending disease.

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PSYCHIATRY

Police Can Be Helped By Part-Time Psychiatrist

THE POLICE, Dr. David H. Wilson of the School of Criminology, University of California, Berkeley, has reported, are often the first to see and have to deal with individuals who are emotionally disturbed or mentally ill.

Dr. Wilson devotes one-fourth of his time to the police department of Berkeley.

"Probably the majority of disturbed juveniles and a good portion of disturbed adults are brought to the attention of the police," Dr. Wilson said, "long before the psychiatric problem is severe enough to indicate a purely medical disposition."

As part of his duties in the police department, Dr. Wilson helps in the handling of arrested persons who are mentally ill, helps to see to it that those who need treatment receive it, and aids in the handling of disturbed prisoners in jail.

He also gives his attention to the police themselves. Any candidate for the police force can be eliminated if, in the opinion of the psychiatrist, he shows indications of psychiatric disorder sufficient to interfere with the performance of his duties.

In addition, the psychiatrist helps train the individual patrolmen so that they will know how to handle disturbed citizens on their beats.

There are 90 American cities, Dr. Wilson said, which might utilize at least part-time psychiatric services, and 20 of these might consider one or more full-time psychiatrists.

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fully examined for the occasional case of valve mechanism is dilated and sags down-

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EDUCATION

Need Science Museums

MORE LOCAL museums are needed to play larger roles in telling the people about past, present and future science and technology, Watson Davis, director of SCIENCE SERVICE, Washington, told the American Association of Museums meeting in Pittsburgh, Pa. Museums can become major means of communication of intelligence and knowledge along with schools, newspapers, books and television.

"If the talents of young science experimenters in science clubs and fairs are enlisted in this major task of public education through demonstrations and exhibits," Mr. Davis said, "there would be major reinforcement of the renaissance of science and education that is now in progress."

A greatly augmented museum structure for the nation would have the triple purpose of showing objectively the astounding progress of the past, the accelerating developments of the present and the enticing future in science and technology.

In the year 2000, Mr. Davis predicted, museums will have halls devoted to the rise of automatic intelligence machines, and modes of energy production not yet developed such as power from the peaceful application of the fusion reaction in the powerful H-bomb.

Museums for art have dominated the museum situation, Mr. Davis said. More art museums are needed, he emphasized, but there should be a basic science and technology museum within easy traveling distance of every locality.

In addition to showing the fundamental evolution of our culture, local museums should preserve and glorify the ingenuity and mechanical progress that has occurred in their localities through the genius of inventors and scientists. They should point up great natural wonders, like geological records in the rocks, that otherwise would go unnoticed.

Through cooperation with schools, youth groups, colleges, newspapers, industries and professional groups, museums can become a greater force locally, Mr. Davis said. TV stations should have their cameras in museums. What happens in the new dynamic, objective centers of knowledge is just as important as sports events.

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AERONAUTICS

Invent Inflatable Plane

PILOTS downed behind enemy lines now have a "heaven-sent" escape system: a packaged inflatable airplane that can be dropped to them by parachute.

The invention is so simple to operate that the pilot can be airborne and on his way to safety five minutes after he reaches the package.

The entire package weighs 565 pounds, including the fuel, container, and parachute. The aircraft weighs 225 pounds empty and carries 180 pounds of fuel. Its maximum payload is 240 pounds.

The two-cylinder, partly aluminum engine develops 42 horsepower and runs for six and one-half hours on a full load of fuel. Cruising speed is 60 miles an hour and maximum is 72.

The air compressor used for inflation runs off the engine and maintains optimum pressure (with the help of a valve in the plane's tail) from the ground all the way up to the plane's 10,300-foot service ceiling.

The little (22-foot wingspan) ship requires a take-off run of 250 feet in calm air. But a slight wind reduces the run distance quite a bit. For example it can take off into a 10-mile-an-hour wind after a run of 125 feet.

Development of these escape planes has been one of inter-service cooperation. Ten test models, built by Goodyear Aircraft Corporation, are being tested, five each by the Army and the Navy.

Each of the models cost $19,500, but on a production basis they are expected to run about $8,000. One reason for the high cost is the difficulty involved in weaving the special foldable inflatable fabric.

The inventors are Maj. Darrel L. Ritter, USMC, Cmdr. Leo B. Blocker, USN, and Lt. Col. Julian Willcox, USMC. All are on widely separated overseas assignments now, but they worked out the invention while together at the Air Branch of the Office of Naval Research.

They recently received a patent, which they assigned to the United States of America as represented by the Secretary of the Navy.

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AGRICULTURE

A-Irradiation Yields Rust-Resistant Bluegrass

ATOMIC radiation may soon present you with a better looking lawn, according to research reported by the U. S. Department of Agriculture.

A new strain of Merion Kentucky bluegrass has been produced that is resistant to stem rust, a major disease of this grass. The new bluegrass is apparently a mutant produced when rust-susceptible seeds were treated with varying intensities of radiation at the Brookhaven National Laboratory, Upton, N. Y.

Selected plants from the treated seed produced a second generation of more than 3,000 individuals, USDA researchers Angus A. Hanson and Felix V. Juska said. One line of ten plants remained free of stem rust and continued to grow throughout the normal bluegrass season. In contrast, top growth was killed back to ground level in the majority of rust-infested plants.

When hybridization is difficult, as in bluegrass where few plants reproduce sexually, radiation may be an effective tool for introducing variation, the scientists pointed out.

Further tests under lawn-management conditions are necessary to determine the full potential of the new bluegrass. However, its future is promising, the scientists said.

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BETTER BLUEGRASS—Drs. Angus A. Hanson (left) and Felix V. Juska study the differences between new stem rust-resistant bluegrass on the right, which is making good progress, with the infected grass.

ASTRONAUTICS

Scientist Pleads for Russian Satellite Data

AN AUSTRALIAN scientist is hearing peculiar noises on his radio and would like the Russians to give out information about the radio transmission equipment on board Sputnik III.

The plea for even "a little information on the emitting equipment" is made in *Nature* (May 30). It comes from Dr. G. H. Munro of the University of Sydney's electrical engineering department.

Sputnik III is the giant satellite weighing one and a half tons launched in May, 1958, by the Russians. The radio signals from Satellite 1958 Delta 2, as it is officially known, have shown their peculiar behavior since March, Dr. Munro reports. The continuous radiation is not only audible but visible on records.

"The reason for this background radiation would no doubt be apparent if we had a little information on the emitting equipment," Dr. Munro concludes.

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PUBLIC HEALTH

Summertime Hazards

IT IS SUMMERTIME, but the living is not so easy.

This favorite season witnesses a procession of various diseases and hazards through September.

First of all, there is the perennial polio problem. The incidence of this crippling disease reaches its peak during the hottest summer months. Therefore, the sooner persons obtain their three Salk vaccine shots, the better protected they will be. Even the first two shots will offer some protection during the time elapse before the third shot.

As temperatures soar, foods that are ordinarily kept cold sometimes become lukewarm. This provides diarrhea bacteria with the environment most favorable for them.

Milk is now pasteurized and food is usually refrigerated. But foods exposed to warm temperatures can spark the growth of these trouble-causing bacteria.

The sun itself causes trouble. Sunstroke results from too much exercise in the sun's rays. Symptoms for sunstroke and heatstroke are the same: headache, fever, complaint that everything looks red. Sunburn is less serious, but can be dangerous. Soak up the sun in ten- to 15-minute doses first. Then slowly increase the time and intensity of exposure.

Swimming, the great summer outdoor sport, also brings problems. Polluted water is a major hazard in many areas. Swimming pools should be kept clean at all times during the swim season. Swimmers with sinus trouble or ear infections should keep their heads out of water.

Even the cool, pure-looking water from a mountain spring can taste good, yet harbor typhoid fever, dysentery and other microorganisms. Such water supplies can be disinfected by boiling vigorously for at least one minute.

The plant world offers some discomfort during the hot weather months. Poison ivy causes much misery and can result in serious infections. Grass and ragweed pollens cause a succession of allergies from May through frost time.

Snakes are a summertime hazard, too. Bites from poisonous snakes can best be avoided by learning about the kinds of snakes that are in the area and their habitats.

Health leaflets on these and other hot weather hazards may be obtained from the United States Public Health Service, Washington 25, D. C.

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EDUCATION

Electrical Engineers' Curriculum Overhauled

MAJOR changes in the curriculum, to prepare electrical engineers to understand and improve devices that do not exist yet, have been made at the Massachusetts Institute of Technology.

These changes, described in *The Technology Review* (June), have resulted in greater emphasis on fundamental scientific concepts in the engineering classrooms. This has necessitated the production of six new textbooks, and entirely new laboratory apparatus.

Putting this new program into effect has taken several years. One of the central courses, dealing with molecular engineering, was taught for the first time in the school year now ending. The department of electrical engineering is the largest department at MIT, and Prof. Gordon S. Brown, who has directed this radical change in its curriculum, will become Dean of the School of Engineering on July 1.

"Members of previous classes who examine the program now may find little of what they studied in it," Profs. David C. White and Herbert H. Woodson report, "but are likely to find, the faculty hopes, much of what they now wish they had studied."

The central courses, which students now take before they are permitted to specialize in various aspects of electrical engineering, were designed to broaden and deepen their knowledge of science. These courses deal with interactions between charged carriers, fields and materials, in both information-processing and energy-conversion systems, and the laboratory work was planned to stimulate creative thinking about fundamental similarities between such systems.

Profs. White and Woodson have designed a "generalized" machine for this purpose. With it, the unity underlying different kinds of electrical machines can be demonstrated, and students can study new approaches to problems of electromechanical energy conversion. This particular machine has aroused so much interest among engineering educators that it soon will be introduced in the laboratories of nearly 150 other schools.

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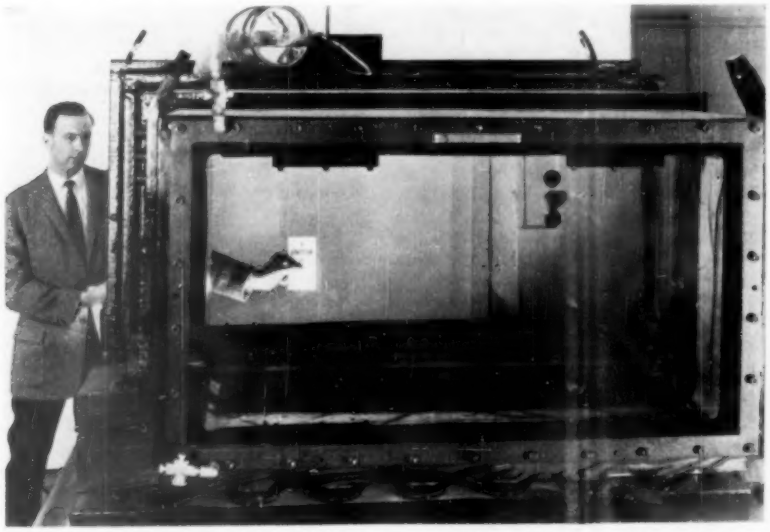

SHIELDING WINDOW—A radiation shielding window eight and one-half feet in depth, believed to be the thickest ever built, has been assembled by Corning Glass Works for the Atomic Energy Commission. The nine-ton window has overall dimensions of 31x64 inches on the "hot" side and 22x42 inches on the viewing side. It will be installed in a new flight engine test facility at the National Reactor Testing Station, Idaho Falls, Idaho.

ENGINEERING

Use Inflated Plastic For Solar Water Still

See Front Cover

A PROTOTYPE plastic solar still has been installed at Daytona Beach, Fla.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows sea water being converted to fresh water at a rate of about 100 gallons a day under the inflated plastic covers.

The 2,500 square-foot basin, and two other stills on the same site, are operated by Battelle Memorial Institute under contract to the U. S. Office of Saline Water.

This Florida research involves testing various solar still designs at a seashore location and points the way toward solar distillation plants of much larger capacity.

The process is a simple one wherein the sun's rays heat sea water which then vaporizes and condenses on the underside of plastic or glass covers. The fresh water runs down the sloping surfaces and is collected.

Science News Letter, June 13, 1959

PHYSIOLOGY

Man Could Fly If He Had Wings

MAN COULD fly by his own muscle-power if his body were naturally equipped with wings. But it may be possible to engineer fine equipment to enable him to attain one of the ages-old dreams of mankind: to fly like birds.

Calculations by Dr. D. R. Wilkie of University College's department of physiology, London, England, indicate wings built for two men might be more immediately practical. Nevertheless, he concludes, "calculation thus indicates that practical man-powered flight is possible. . . . Clearly, the matter should be put to experimental test." He called for a skillfully engineered flying device.

In studies on dogs, men, and horses, Dr. Wilkie found that it takes about 0.1 horsepower just to keep a man's body operating properly while resting. This power output is in the form of heat.

He found that a 175-pound man could generate about 0.4 horsepower for five to 30 minutes at such tasks as rowing, bicycling or climbing. The same man could put out a burst of energy at the two-horsepower level, but only for a few seconds. This is done by incurring an oxygen-debt in the body, which ultimately leads to blackout.

Then by calculating the power required to fly, using as his basis the great bustard which weighs about 30 pounds, Dr. Wilkie shows on a graph that the power required for man to fly was about 0.4 horsepower, the level at which he showed a man could work for five to 30 minutes.

The graph also shows that theoretically the dog could fly, but that the horse would soon crash. Dr. Wilkie's full report appears in *Nature* (May 30).

Science News Letter, June 13, 1959

BIOLOGY

Known Chemical "Meal" Supports Cell Growth

RESEARCHERS have just handed the biologists and chemists a menu for mammalian cells.

Now scientists should be able to determine directly differences in food requirements for normal and cancer cells, and different ways the cells use various nutrients. It may also be possible to arrest the growth of malignant cells by merely changing their diet or by introducing cancer-specific poisons.

Instead of "feeding" mouse cells with expensive—and relatively unidentified—substances such as blood serum, embryo juices and proteins, Dr. Charity Waymouth of the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Me., is using a culture medium of 40 completely defined ingredients. This chemical solution, costing about $1.25 a quart, is supporting an "almost explosive growth of mouse cells."

The medium contains, among other compounds, table salt, potassium chloride, calcium chloride, magnesium chloride, dextrose, nine vitamins and 16 L-form amino acids.

Development of the synthetic medium is the result of more than seven years of research. Dr. Waymouth gradually altered the proportions of known chemicals in the culture mediums she used to grow mouse cells, removing first the blood serum and then the proteins and protein fragments called peptones.

For more than a year, she said, the mouse cells have been growing on the 40 simple compounds. Each week the number of cells increases seven- or eight-fold.

However, the cells appear to thrive on other diets, Dr. Waymouth reported. She will continue to study possible simpler and better nutrient mediums.

The study was supported by an American Cancer Society grant made to Dr. Philip R. White of the Jackson Laboratory. Dr. Waymouth is a research associate of Dr. White.

Science News Letter, June 13, 1959

CONSERVATION

Finance Study to Control Alaskan Sea Lions

SEA LIONS along the Alaskan coastline have been a costly nuisance to fishermen, and the Federal Government has decided to do something about it.

The estimated 150,000 sea lions inhabiting the rocky coastal cliffs and seaweed-covered reefs often eat or mutilate salmon and halibut caught in nets, and are even suspected of being serious predators on free-swimming salmon at sea.

In an attempt to determine just how much damage the sea lions are doing to Alaskan fisheries, and what can be done to control their numbers, the U. S. Bureau of Commercial Fisheries has awarded a $50,000 contract to Arctic Maid Fisheries, a fish-packing firm, to conduct a two-month study near Kodiak Island and westward to the Aleutians.

Another aim of the research will be to try to find a commercial use and profitable market for sea lion carcasses. Sea lions are not now known to be useful.

Possible uses to be tested are the feeding of meat and liver to mink on fur farms, the tanning of hides for specialty leather, and the reduction of carcasses to industrial meal and oil. What little fur sea lions have is valueless and their hides are too thick for most general leather purposes.

The species of sea lions that inhabit Alaskan waters is far larger than the more familiar but less numerous California sea lion. Male animals weigh as much as a ton and females are about half that size. Because of their fewer numbers, the California species has not been a nuisance to fishing.

If the research, which will be conducted from Arctic Maid's freezer ship, can lead to the establishment of a commercial value and market for sea lions, Alaska may have a new industry and fishermen may obtain some relief from "harassment and financial loss," the Bureau reported.

Science News Letter, June 13, 1959

IN SCIEN

CHEMISTRY

Brain Chemicals Help To Explain Hallucination

BRAIN CHEMICALS may be the cause of hallucinations.

Recent research suggests that hallucinations occur because abnormal brain chemistry causes signal mix-ups between parts of the brain that handle information. Experiments indicate that brain-produced substances called psychotogens disrupt communication between the association and visual centers of the brain. Hallucination may result, Dr. Amedeo S. Marrazzi, director of the Veterans Administration's research laboratories in neuropsychiatry, said.

To test for variations in susceptibility to hallucinations and for the effect of disturbance in brain chemistry, Dr. Marrazzi is working with volunteers. These include normal and mentally ill persons and those with physical damage to the brain's visual association area.

In these experiments, the volunteers are exposed to optical illusions before and after receiving very small doses of certain drugs. These drugs, serotonin is one, are known to increase tendencies to see things different from reality.

Serotonin is a naturally occurring brain chemical that, in excess, slows transmission of messages along the brain's nerve circuits, thus disrupting thought relays.

Tracing the mechanism of hallucination, often found in mental disease, would give scientists a firm basis on which to build toward the specific diagnosis and treatment of mental illness, it is believed.

Science News Letter, June 13, 1959

ENGINEERING

System Overcomes Re-Entry Blackout

"BLACKOUT" of radio signals from missiles re-entering the earth's atmosphere can be overcome by a new flight-testing system.

Radio "blackout" occurs when a space vehicle plummets back into the dense atmosphere at tremendous speed, causing a shell of electrically charged or ionized gas to be formed around the vehicle by air friction. This shell temporarily prevents radio signals from being sent out of the vehicle.

The system, described at the Institute of Radio Engineers meeting in New York, by R. E. Schmidt, J. R. White and R. A Porter of Avco Manufacturing Corporation, Wilmington, Mass., transmits flight data to earth as it is gathered But, in addition, it stores the same data on magnetic tape and transmits it again after a fixed interval. Thus, if the first transmission is blacked out, the second will occur after the vehicle has emerged from the blackout region.

Science News Letter, June 13, 1959

CE FIELDS

NAVIGATION

Navigation System Without Radio or Stars

A NEW NAVIGATION system that enables a person to determine his position above, on, or under the surface of the earth without the aid of radio signals or astronomical readings has been recently patented.

The system is not dependent upon weather conditions as is celestial navigation. Neither is it subject to man-made or accidental interference or to failure of complicated equipment as is radio navigation.

It involves measuring magnetic variation or declination (the angle between the direction indicated as north and true north) and magnetic inclination (the angle at which a magnet needle dips about a horizontal axis when oriented toward magnetic north). The two measurements are combined to determine the position of the observer.

Half of the system's apparatus consists of a regular compass, a gyrocompass and means to determine position along lines of equal magnetic variation, or isogonal lines. These lines extend generally north and south and approximate lines of longitude.

The other half of the apparatus comprises a magnetic inclinometer to measure magnetic dip and a device for determining the angle of the earth's surface at the place of measurement. It establishes a position along isoclinal lines, or lines of equal magnetic declination, running generally east and west, similar to lines of latitude.

By reference to a map carrying isoclinal and isogonal lines, a person's actual position may be determined. Conversion to longitude and latitude may also be easily done.

The inventor, John D. Lawson of Dallas, Texas, assigned his patent to Texas Instruments Incorporated, also of Dallas.

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AGRICULTURE

Treated Irrigation Water Controls Citrus Pest

A NEMATODE that infests more than half the citrus groves in Arizona may be on its way out.

A new method of chemically treating irrigation water has controlled the destructive pest in several test groves, the U. S. Department of Agriculture reported. Citrus is a $10,000,000 to $20,000,000 business in just the one state of Arizona.

From two to ten gallons of DBCP (1,2-dibromo-3-chloropropane) was applied per acre, USDA nematologists H. W. Reynolds and J. H. O'Bannon said. Methods of application varied. In one, the chemical and the irrigation water were discharged into individually bordered rows In another, the chemical and water, well-mixed, was added in measured amounts directly to the irrigation water.

Soil and root samples collected from treated and untreated plots showed the treatment had given almost 100% effective control.

When the DBCP treatment was combined with various methods of pruning, the nematode-infested trees were rejuvenated and recovered much faster than with pruning alone.

During a five-year period, USDA researchers estimated, the complete treatment would cost about $16 a year per acre. This is considerably cheaper than pulling out old trees, fumigating the soil and planting new trees that will not bear fruit for several years, they said.

Symptoms of infestation with the citrus nematode are usually not apparent until three to five years after infection. The nematode lives on the outside of the roots, feeding by puncturing the root cortex with its mouth parts. When it has used up all the available nutrients, it dies off after causing serious damage. Symptoms include yellowing leaves, small fruit and leaf-less branch ends.

Science News Letter, June 13, 1959

PUBLIC SAFETY

Cold-Water Swimmers Cautioned on Dangers

COLD WATER is a special danger to the early-season swimmers, especially those who are not accustomed to cold water, A. W. Cantwell, Red Cross national director of Safety Services, said.

Plunging into cold water creates a shock to the system. It is not true that this effect is stimulating. Instead, it is exhausting. Therefore, swimmers lose energy and become tired more quickly.

"It is not courageous to take a sudden plunge into cold water. It is just plain foolhardy," the director said.

Enter the water gradually. Do not attempt to equal your Labor Day swimming exploits on your first swim. After nine months of sedentary living, the physical condition and endurance of the body are not what they were last summer.

Red Cross safety hints for water sports lovers include: learn to swim; always swim with another person; swim in a safe and familiar area; equip boats with safety devices; do not swim right after eating, when overheated or overtired.

The back yard water fan is not excluded, either. Advice came from the American Medical Association to the approximately 125,000 pool owners plus the owners of more than 1,000,000 plastic pools for small fry.

These pools account for not only drownings, but colds, ear-nose infections, skin troubles and other diseases where strict rules for correct water sanitation are neglected.

The water safety advice appears in *Today's Health* (June).

Science News Letter, June 13, 1959

ZOOLOGY

Helicopter Used to Take Seal Census

A CENSUS is being taken by helicopter.

The census of 14,000 seals and sea lions has been taken by Drs. George A. Bartholomew and Richard A. Boolootian of the University of California, Los Angeles. The U. S. Air Force and Navy cooperated in the project.

A majority of the census population was made up of California sea lions, which numbered 13,000, a 13-fold increase since the '30's.

The elephant seal which was once brought to the brink of extinction by commercial hunters is making a strong comeback and now numbers in excess of 400, possibly as high as 683. Steller sea lions which numbered 2,000 in 1938 are now down to about 50. The population of harbor seals appears to be about 100.

Two other seals, the Guadalupe fur seal and the Alaska fur seal are known to occur in southern California waters, but none were seen during the census.

It is thought that the rapid increase of the California sea lion and decrease of the Steller sea lion may be due to a warming of the water, resulting in distribution changes of critical food species of fish and invertebrates which are relatively sensitive to such temperature changes. The two varieties of seals are known to have somewhat different food preferences.

The census was taken using aerial photographs in the channel islands of San Nicolas, Anacapa, Santa Barbara, Santa Cruz, Santa Rosa, and San Miguel.

The largest single population observed was on San Miguel, where 8,009 California sea lions, 34 Steller sea lions, 15 harbor seals and 320 elephant seals were photographed during one observation.

Science News Letter, June 13, 1959

AVIATION

Airline Safety Shows Improvement

AIRLINE SAFETY has shown notable improvement in recent years despite an enormous increase in traffic volume and aircraft speeds.

Domestic and international airlines in 1958 carried more than 48,000,000 passengers and flew more than 32,100 million passenger miles, with a loss of 124 lives in six fatal accidents.

There was one fatality per half million passengers or one fatal accident per 163,000,000 miles flown. The fatal accident rate was 0.40 per 100,000,000 passenger miles compared to 0.10 in 1957 and 0.53 during the period 1955-57.

These figures were reported by the Cornell-Guggenheim Aviation Safety Center, New York, in its annual Survey of Research Projects in the Field of Aviation Safety. More than 600 such projects are now in progress in the United States, Canada, Great Britain, France and The Netherlands, the survey stated.

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PUBLIC HEALTH

Fallout: Man-Made Threat

Every rainstorm brings radiation fallout from the skies. Scientists and the AEC still disagree on a permissible level of radiation to which humans can be exposed without damage.

By HELEN BUECHL

EVERY TIME it rains, it rains fallout from nuclear blasts. The amount of fallout that comes down with each rainstorm varies, but the fact remains that radioactive particles accompany each shower.

The fallout consists of such radioactive particles as iodine-131, cesium-137 and strontium-90. Fallout is classified either as "local" or widely distributed.

The larger particles produced by the nuclear explosion give the local fallout. This radioactive debris falls to earth within a radius of a few hundred miles of the blast.

Widely distributed fallout consists of smaller particles thrown very high into the atmosphere by the explosion. This debris tends to remain in the stratosphere for a few years, losing some of its radioactivity during this period.

Man receives radiation from the radioactive particles that drift down from these bomb blasts. He acquires this radioactivity through the food he eats and drinks. The particles settle on vegetables and grains that man eats, and on the grains and feed that animals eat. When animal products are eaten by man, some of the animal's radioactivity is added to the human diet. Such is the case with milk.

Fallout and Sickness

Local fallout tends to produce radiation sickness, skin burns and death. These acute effects depend mainly upon the dose of radiation. Chronic effects such as cancer, lowered resistance to stresses, premature aging and premature death also depend upon the size of the radiation dose from local fallout.

Scientists are still wrestling with the concept of threshold. That is, can man receive a certain dose of radiation without harm, and if there is such a "safe" amount, what is it? Another unknown is the rate at which fallout is settling on the earth.

In an attempt to answer these questions, scientists have been studying the strontium-90 level in milk. This is a relatively revealing index of the amount of fallout reaching the United States daily. It is measured in strontium units.

Strontium-90 levels in milk across the country reflect the increased amount of fallout that has cluttered the atmosphere since 1954. For instance, Atomic Energy Commission reports show that at that time the strontium-90 level in milk in New York City was 2.5 units or micromicrocuries of strontium-90 per gram of calcium. (A micromicrocurie is equal to one millionmillionth of one curie; the curie is an amount of radiation equal to that produced by one gram of radium.)

Before January, 1959, the figures reveal, the level had risen to more than 11 micromicrocuries of strontium-90 per gram of calcium.

The National Committee on Radiological Protection has established a maximum permissible level of 100 strontium units for the general population. Meanwhile, the International Committee on Radiological Protection (ICRP) has tentatively lowered the level to 67. This includes the entire radioactive count of strontium-90 in man's complete diet, not just milk. The permissible level does not mean any radiation level over the limit will automatically cause death or injury, nor, on the other hand, does it imply that any dose below the level will automatically be safe. It is simply a recommended ceiling in the lifetime strontium concentration in the bones.

One Anacostia, D. C., high school junior, Robert Schooley, 17, has built a device that measures the total amount of radiation in milk. The apparatus costs slightly more than $28. Bob measured the radioactivity of milk from May, 1958, through January, 1959, in the Washington, D. C., area. More complicated methods are required to measure the strontium-90 level, however. The Public Health Service has invited this junior scientist to tour the Cincinnati, Ohio, laboratory where PHS technicians measure strontium-90 levels of milk.

Other data show bread picked at random off the shelf of a supermarket in New York City in February, 1959, was four times as "hot" as the ICRP maximum permissible level. The clover grown on a Raleigh, N. C., farm in July of 1957 registered strontium-90 content of more than twice the 100 units allowed.

Alarming Predictions

Further alarming news was revealed in a summary report by scientists on the 1959 Fallout Prediction Panel to the Congressional Joint Subcommittee on Atomic Energy. The report contained predictions the dose of radiation to the reproductive organs of Americans would double within the next few years. This increase will occur when cesium-137, now stored in the stratosphere, begins to descend.

This prediction applies to all persons living in the north temperate zone, including Europeans and Russians as well as Americans. Currently, the dose of radiation to the reproductive organs of persons in this zone is already two and one half times the world average. This figure, however, is within the maximum permissible level, scientists reassure.

Despite this evidence, the General Advisory Committee to the Atomic Energy Commission recently stated that total external radiation from fallout to date, to-

DO-IT-YOURSELF RADIATION DETECTOR—Robert Schooley, 17-year-old high school junior, pours milk into a device he built and used to measure the total radioactivity of milk in the Washington, D. C., area. He found that the radioactive content of milk fluctuates.

gether with any estimated fallout from future weapons tests, is less than five percent as much as the average exposure to cosmic rays and other natural background radiation. The amount is also less than five percent of the estimated average radiation dose Americans receive from X-rays for medical purposes, the committee added.

This, however, is only an average. The percentages fluctuate from 15% to 30% depending upon the section of the U. S. that is sampled.

The Committee also reported that human beings have lived for many generations in parts of the world having five or more times the background radiation normally found in this country, or more than 100 times the average amount of radiation from fallout in the U. S.

No one has yet proved these levels are safe, however. No studies have been made to determine the biological effects of these higher levels.

But it is now beyond question that humans exposed to fairly large doses of radiation have an increased chance of developing leukemia, Dr. Austin M. Brues, director of biological and medical research, Argonne National Laboratory, Lemont, Ill., stated before a Congressional Subcommittee on Atomic Energy. Similar evidence makes it clear that radium in the human skeleton has been responsible for cancer of the bone in humans, he said.

There is still no direct evidence that small doses of radiation, such as those from natural background and fallout, will definitely produce a proportionally low number of leukemias and cancers, nor that a low dose will necessarily shorten the average life span, the scientist testified.

On the other side of the coin, Dr. W. L. Russell of the Oak Ridge National Laboratory, Oak Ridge, Tenn., presented revealing evidence concerning the effects of radiation on pregnant mice.

Genetic Damage Found

He showed that genetic damages, i.e., sterility, can occur in unborn female mice, depending upon the length of time a dose of radiation is directed on a target. He suggested there may be a similar reaction to radiation in pregnant humans that could result in sterile baby girls. But this does not necessarily lead to the conclusion that there is a threshold dose of radiation above which genetic damage will occur, he emphasized.

Scientists appear to agree that the most likely victim of radiation exposure will be the unborn child and the infant. This is due to radioactive iodine attracted to the thyroid gland, which, in the infant, receives some 15 to 20 times the dose received by adults.

In addition, bone growth is most rapid during this stage of human development. Since strontium-90 is attracted to bone, and since both radioactive iodine and strontium are present in milk, an important component of the child's diet, it seems logical that the youngsters will be the more likely candidates for thyroid and bone cancers.

Meanwhile, Atomic Energy Commission scientists are busy considering methods for testing weapons that will avoid creating fallout in the first place.

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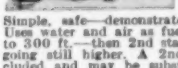

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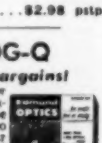

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• Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ADVANCED CALCULUS: A Text upon Select Parts of Differential Calculus, Differential Equations, Integral Calculus, Theory of Functions, with Numerous Exercises—Edwin Bidwell Wilson—*Dover*, 566 p., paper, $2.45. Reprint of standard text.

ANALYTICAL TRANSIENTS — T. C. Gordon Wagner—*Wiley*, 202 p., $8.75. Text for graduate electrical engineering course.

THE BOOK OF MISSILES—Clive E. Davis—*Dodd*, 96 p., illus., $2.75. Information on U. S. missiles, written for the layman.

CAUSALITY: The Place of the Causal Principle in Modern Science — Mario Bunge — *Harvard Univ. Press*, 380 p., illus., $7.50. Essay on determinism, showing how the causal principle actually works in various departments of modern science.

THE CHALLENGE OF SPACE EXPLORATION: A Technical Introduction to Space—*National Aeronautics and Space Administration*, 47 p., illus., paper, free upon request direct to publisher, 1520 H Street, N.W., Washington 25, D. C. Concise little handbook, with additional sheets giving data on satellites and lunar probes 1957-58-59.

THE CHALLENGE OF THE SPACESHIP: Previews of Tomorrow's World — Arthur C. Clarke — *Harper*, 213 p., $3.50. Collection of scientific and speculative articles on space travel, containing minimum of technical matter.

COLLECTIVE BARGAINING AS VIEWED BY UNORGANIZED ENGINEERS AND SCIENTISTS—John W. Riegel—*Bureau of Industrial Relations, Univ. of Mich.*, 105 p., $4. See SNL March 28, 1959, p. 201.

CONCEPTS OF MENTAL HEALTH AND CONSULTATION: Their Application in Public Health Social Work—Gerald Caplan, supplemented by Virginia Insley—*Children's Bureau (Govt. Print. Off.)*, 269 p., paper, $1. Among other aspects discusses personality development and mother-child relationships.

DEVELOPMENTAL CYTOLOGY—John R. Preer Jr. and others, Dorothea Rudnick, Ed.—*Ronald*, 215 p., illus., $7. Papers presented at the 16th Symposium of the Society for the Study of Development and Growth, surveying advances in the understanding of cellular structure and function.

DIRECTORY OF PERIODICALS PUBLISHED BY INTERNATIONAL ORGANIZATIONS—Union of International Associations—*UIA*, (Palais d'Egmont, Brussels 1, Belgium), 2nd ed., 241 p., paper, $3. Information on 1,340 periodicals published by non-governmental and inter-governmental international agencies.

ELEMENTS OF MATERIALS SCIENCE: An Introductory Text for Engineering Students—Lawrence H. Van Vlack—*Addison-Wesley*, 528 p., illus., $8.50. Elementary textbook aimed at giving the prospective engineer a basic understanding of the structure and characteristics of materials.

FIVE FAMILIES: Mexican Case Studies in the Culture of Poverty—Oscar Lewis, foreword by Oliver La Farge—*Basic Bks.*, 351 p., illus., $5.50. Using technique of ethnological reportage, anthropologist describes a day in the life of five Mexican households, illustrating thus the dynamics of poverty.

THE FLOORS OF THE OCEANS: I. The North Atlantic—Bruce C. Heezen, Marie Tharp and Maurice Ewing—*Geological Soc. of Am.*, Special Paper 65, 122 p., illus., $1.50. Text accompanying the physiographic diagram of the North Atlantic, describing continental margin, ocean-basin floor and mid-oceanic ridges.

FRUIT KEY AND TWIG KEY TO TREES AND SHRUBS: Fruit Key to Northeastern Trees, Twig Key to the Deciduous Woody Plants of Eastern North America—William H. Harlow—*Dover*, 56 p., illus., $1.25. Reprint combines books published in 1941 and 1946, respectively.

FUNDAMENTALS OF PHYSICAL CHEMISTRY—H. D. Crockford and Samuel B. Knight—*Wiley*, 463 p., illus., $6.95. Short course for biology and premedical students, requiring only limited background in mathematics.

GEOCHEMICAL METHODS OF PROSPECTING AND EXPLORATION FOR PETROLEUM AND NATURAL GAS —A. A. Kartsev and others, English transl. edited by Paul A. Witherspoon and William D. Romey—*Univ. of Calif. Press*, 349 p., illus., $12.50. Comprehensive coverage of geochemical prospecting for petroleum in the Soviet Union, with detailed descriptions of methodology and results.

THE HARVEY LECTURES: Delivered under the auspices of The Harvey Society of New York, 1957-1958—John H. Dingle, Joshua Lederberg and others—*Academic*, 254 p., illus., $7.50. Contains epidemiological study of illness in families, lectures on bacterial reproduction, cell division and other subjects.

HIGH ALTITUDE AND SATELLITE ROCKETS: Symposium—A. D. Baxter, Chmn.—*Philosophical Lib.*, 136 p., illus., $15. Papers and discussions of British high-altitude rockets, sponsored by The Royal Aeronautical Society, The British Interplanetary Society and The College of Aeronautics in 1957 before the Russian and American satellites were launched.

THE HUMAN MEANING OF THE SOCIAL SCIENCES—Daniel Lerner, Ed.—*Meridian Bks.*, 317 p., paper, $1.45. Original essays on the history and application of the social sciences by Margaret Mead, Harry Alpert, Harold D. Lasswell and others.

THE IDEA OF THE UNIVERSITY—Karl Jaspers, Karl W. Deutsch, Ed., preface by Robert Ulich, transl. from German by H. A. T. Reiche and H. F. Vanderschmidt—*Beacon Press*, 135 p., $3.75. Analyzes (1945) the whole organization of the university, the relation of research and instruction, the logic behind academic departments, the roles of administrator, teacher and student.

INTRODUCTORY CHEMISTRY—Lillian Hoagland Meyer—*Macmillan*, 2nd ed., 528 p., illus., $6. Simplified textbook for the non-chemistry major.

INTRODUCTORY COLLEGE MATHEMATICS — Thomas L. Wade—*Wiley*, 319 p., $5.50. Textbook for the better prepared freshmen.

LET'S HAVE HEALTHY CHILDREN — Adelle Davis—*Harcourt*, rev. ed., 314 p., illus., $3.50. Nutritionist's guide for mothers and expectant mothers.

MATHEMATICAL RECREATIONS OF LEWIS CARROLL, Vol. I: Symbolic Logic and The Games of Logic. Vol. II: Pillow Problems and A Tangled Tale—Lewis Carroll—*Dover*, 4th ed., 296 and 261 p. resp., illus., paper, $1.50 each volume. Reprint of 1895 edition of the mathematical puzzles by the author of "Alice in Wonderland."

METHODS OF EXPERIMENTAL PHYSICS, Vol. I: Classical Methods—Immanuel Estermann, Ed.,

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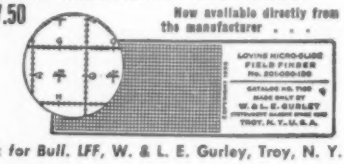

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L. Marton, Ed.-in-Chief—*Academic*, 596 p., illus., $12.80. Presentation of the most important methods and general principles used in experimental physics, for the advanced student, teacher and research scientist.

A Modern Introduction to College Mathematics—Israel H. Rose—*Wiley*, 530 p., $6.50. Contains common course for first semester, followed by two alternative semesters for either the technical or the liberal arts student.

New Facts About Birth Control—Alan F. Guttmacher and Joan Gould—*Public Affairs Committee*, Pamphlet No. 136B, 20 p., illus., paper, 25¢. Authoritative information about how couples can plan parenthood.

The New Science: Where is Science Going? The Universe in the Light of Modern Physics. The Philosophy of Physics.—Max Planck—*Meridian Bks.*, new ed., 328 p., $5. Philosophical writings of the late physicist-Nobelist, of whose work Einstein wrote in the 1932 preface that "it has given one of the most powerful of all impulses to the progress of science."

1959 Heat Transfer and Fluid Mechanics Institute: Preprints of Papers—R. Schamberg and others—*Stanford Univ. Press*, 243 p., illus., paper, $7.50. Held at University of California, Los Angeles, June 11, 12, 13, 1959.

Off Into Space: Science for Young Space Travelers — Margaret O. Hyde — *Whittlesey House*, 64 p., illus. by Bernice Myers, $2.50. Acquaints eight-to-twelve-year-olds with facts about gravity, atmosphere, the principles of rocket travel and astronomy.

The Orchids: A Scientific Survey—Carl L. Withner, Ed.—*Ronald*, 648 p., illus., $14. Emphasis is on the botanical, rather than horticultural approach to orchids; work covers present scientific literature on the biology of orchids, pointing out areas for future research.

Organic Chemistry—Melvin J. Astle and J. Reid Shelton—*Harper*, 2nd ed., 771 p., illus., $7.50. Text presents theoretical discussion of organic chemistry, calling also attention to its applications in industry.

Radiation Protection: Recommendations of the International Commission on Radiological Protection—Gioacchino Failla, Chmn.—*Pergamon Press*, 18 p., 50¢. Report of Main Commission, with recommendations on maximum permissible doses for individuals, special groups and general population, and general principles regarding working conditions.

Radioactive Fallout: A Two-Year Summary Report—Charles L. Dunham—*U. S. Atomic Energy Commission (Off. of Tech. Serv.)*, 110 p., paper, $1.25. Includes seven reports on specific AEC studies relating to fallout.

The Rainbow: From Myth to Mathematics—Carl B. Boyer—*Yoseloff*, 376 p., illus., $10. History of man's ideas about the rainbow from antiquity to the twentieth century, fully documented.

The Romance of Chemistry: From Ancient Alchemy to Nuclear Fission—Keith Gordon Irwin—*Viking*, 148 p., illus. by Anthony Ravielli, $3.75. Story of the great chemists and their contributions, with very fine line-drawn portraits.

Some Sunspots and Flare Statistics—Barbara Bell and Harold Glazer—*Smithsonian Contributions to Astrophysics (Govt. Print. Off.)*, 38 p., paper, 20¢.

Sounding Rockets—Homer E. Newell Jr. and others—*McGraw*, 334 p., illus., $12.50. Comprehensive survey of the principal high-altitude rockets used for geophysical and solar research in the U. S., England, France and Japan. Reference work for rocket engineers and high-altitude researchers.

The Story of Madame Curie—Alice Thorne—*Grosset*, 176 p., illus. by Frederico Castellon, $1.95. Biography for young children.

(Continued on p. 382)

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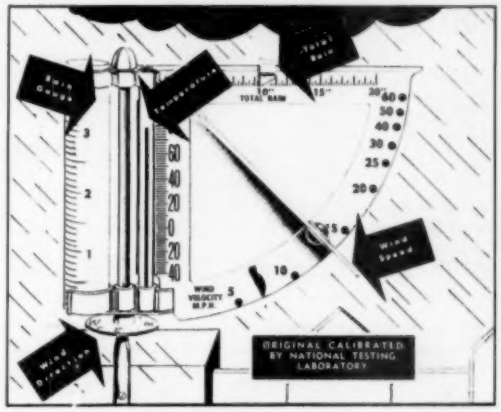

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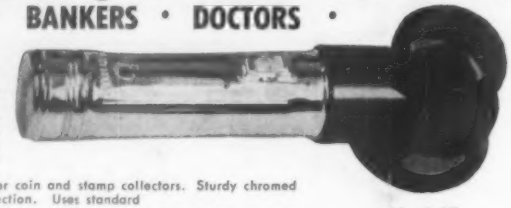

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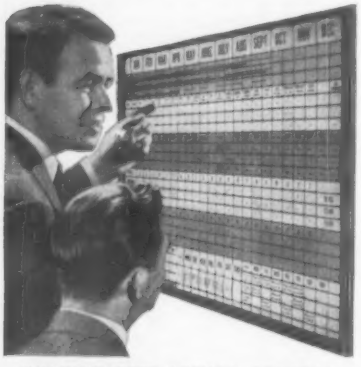

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Books of the Week

(Continued from p. 381)

SURVEY OF STATE LEGISLATION RELATING TO HIGHER EDUCATION, July 1, 1957 to June 30, 1958—Ernest V. Hollis, William G. Land and S. V. Martorana—*Office of Education (Govt. Print. Off.)*, 115 p., paper, 70¢. Abstracts of State legislative action, reflecting national anxiety over the cost of obtaining a college education.

THEORETICAL ELASTICITY—Carl E. Pearson—*Harvard Univ. Press*, 218 p., $6. Graduate course discussing modern methods of elasticity theory, thoroughly treating thermo-elasticity, wave motion and non-linear elasticity.

THEORY OF FUNCTIONALS AND OF INTEGRAL AND INTEGRO-DIFFERENTIAL EQUATIONS — Vito Volterra, preface by Griffith C. Evans, biography of Vito Volterra and bibliography of his published works by Sir Edmund Whittaker—*Dover*, 226 p., paper, $1.75. Reprint of 1930 English edition with additions.

TREATISE ON INVERTEBRATE PALEONTOLOGY: Part O: Arthropoda 1 (Trilobitomorphs)—Raymond C. Moore, Ed.—*Geological Soc. of Am.*, 560 p., illus., $10.50. Primarily concerned with the trilobites, this volume of the Treatise is the product of the collaboration of 18 specialists from seven different nations.

Science News Letter, June 13, 1959

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(Continued on p. 502)

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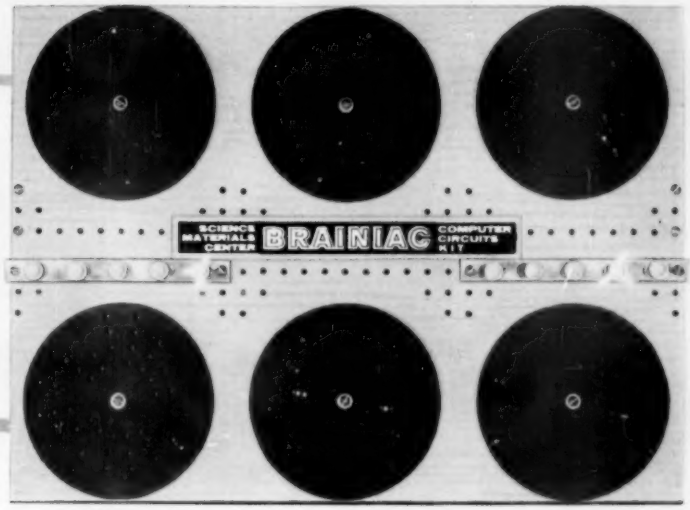

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HELICOPTER, built at home, weighs 350 pounds, has a rotor diameter of 21½ feet, and can perform all the maneuvers of a full-sized craft. It has a range of 120 miles and a top speed of 60 miles per hour. Powered by a 40 horsepower motorcycle engine, it can fly more than 30 miles on a gallon of gasoline.

Science News Letter, June 13, 1959

PLASTIC GOGGLES to deflect grindings, small pebbles, dust and other eye-injuring particles also absorb glare. Weighing less than one ounce and comfortable to wear by themselves or over most prescription glasses, they are available in clear or green lenses with matching frames.

Science News Letter, June 13, 1959

MARINE SNAP FASTENERS, used to secure protective covers to control panels, cockpits, hatches, outboard motors and dinghies, work fast, hold fast and need a minimum of maintenance and replacement. The fasteners are rustproof brass with nickel, chrome or black finish.

Science News Letter, June 13, 1959

LEVELING DEVICE, shown in the photograph, that replaces plumb bobs and spirit levels consists of a small steel ball sealed into a plastic container, one inch

in diameter. It is especially useful on the base of a mechanical universe, which must be kept level to measure sun time and relative time in all world time zones. The device may also be used for leveling stoves, shelves, desks, etc.

Science News Letter, June 13, 1959

GAS-FIRED OUTDOOR LAMP has a tiny pilot-light that burns continuously, and a simple remote-control unit, installed inside the house, for turning the lamp up at night. The lamp is of weather-proof construction and uses natural, manufactured, mixed, or LP gas.

Science News Letter, June 13, 1959

DOG HAIR-DRYERS of cast aluminum hang on cages by sturdy swivel brackets. Useful for pet shop owners, kennel owners and veterinarians, the dryers send out a flow of air—adjustable from cool to hot—that soothes as it dries. The quiet motor of the 18-inch-long unit is said not to disturb or frighten animals.

Science News Letter, June 13, 1959

BUILDING PANELS of green-colored aluminum provide low-cost, attractive material for residential sidewall panels, roofs, patios, carports, decorative fences, interior wall covering, summer cottages and boat shelters. They have a 48-inch width after lapping and come in lengths of 8, 10, 12, 14, and 16 feet.

Science News Letter, June 13, 1959

BEVEL SQUARE with eight-inch nickel-plated blade doubles as a T square. The unbreakable, one-piece plastic handle is said to be perfectly square on all edges to permit precision measurements.

Science News Letter, June 13, 1959

Nature Ramblings

By HORACE LOFTIN

TRUE JUNGLE—the tropical rain forest—seems barren of mammal life to the man who walks mile after mile across the open forest floor which is cool, damp and dark from the shadows cast by the trees towering overhead.

Where are the kinkajous, the coatimundis, the sloths, the anteaters and other tropic creatures? Is this jungle a desert?

To find the typical jungle mammals, a man has to set his sights high: as high as the treetops, as a matter of fact. For that is the main theater of life for large jungle creatures.

A whole world exists in the high forest canopy of the typical rain forest, its creatures perfectly adapted for life among the limbs. Some jungle mammals like the opossums, coatis, squirrels and kinkajous make fairly frequent forays to the earth, but soon return to the treetops. Others, like certain anteaters, sloths and monkeys, spend prac-

Jungle Treetops

tically their whole lives in their green mansions.

Nearly all arboreal or partially arboreal mammals have hand-like feet, with long, pliable toes and strong claws for secure footing. Some, like the opossum and certain monkeys, have thumbs which are opposable to the fingers or toes for a good, solid grasp.

An exception to the hand-like foot is seen in the sloth. This topsy-turvy creature spends most of its time hanging bottoms up from the limb of a tree. For this unique kind of life it has developed tremendous hooked claws with which it suspends itself.

Another useful adjunct for life in the treetops is a prehensile tail such as is carried by the kinkajou (see illustration) and the American monkeys. This sensitive tail is used both for grasping and for balancing. Often aboreal animals without prehensile tails have bushy tails—very useful as a parachute and cushion.

The arboreal anteater of the American tropics almost never leaves the trees. It has a long prehensile tail and grasping feet to help in its search through the limbs for ant nests.

The creatures of the treetops in general have excellent eyesight, which sometimes is developed at the expense of the sense of smell. Man shares his well-developed hands and eyesight with the tree dwellers, his ancient ancestors.

Science News Letter, June 13, 1959